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NOTES ON THE HABITS OF CERTAIN MOMOTIDÆ.

BY GEO. F. GAUMER, SANTA FÉ, NEW MEXICO.

The family of Momotidæ is a small family of birds, all the species of which are inhabitants of tropical America. Only seventeen species and varieties have been described, and so closely are these allied each to the other that it is often with great difficulty that any difference can be distinguished between them. Yet a careful study of these birds in their native country shows that each species has its peculiar mode of living and also its particular cry, which are always distinct and well-defined characteristics.

This family of birds is wholly American and tropical, not a single species being known to inhabit the eastern hemisphere, nor do those of the western ever roam beyond the tropics; and while these birds are found from the West Indian islands to the Pacific ocean, and from central Mexico to Brazil, yet rarely are more than two species found in the same locality, and generally only one is common.

The Momotidæ belong to the sub-order of Anisodactyli, or those birds which have uneven feet. The outer toe is much longer than the inner, and is united to the middle in such a way as to form a common sole one-half of its entire length. The sole of the hind toe is widened, and forms a continuous sole internally with the inner toe.

The characteristics of the family may be briefly given as follows: The bill is as long as the head, gently tapering and decurved near the tip, but not hooked. Both mandibles have the cutting edges serrated, except at the tip and base. The nostrils are small, circular, and situated near the frontal feathers. The wings are short and rounded; the inner secondaries in the closed wing reach the tips of the primaries. Of the ten primaries, the exposed portion of the first is scarcely one-half of the fourth or longest. The secondaries are mostly ten, but sometimes twelve in number. The tail consists of ten or twelve feathers; the middle feathers are spatulate, or with a portion of the lateral web wanting. Just how this web became mutilated is a question of no less wonder to the naturalist than to the ignorant native who has sought in vain to solve the problem.

But, omitting the more absurd theories, which have their origin only in the imagination, without any foundation in truth, there are one or two which deserve our careful consideration. Some of the natives believe that the web is worn off by the bird itself, while on the nest—that the nest is so constructed that the tail rests upon its walls just where the web is wanting. As it is the custom of these birds to keep the tail in perpetual motion, swinging it from side to side like a pendulum, it is but natural to suppose that this would, after awhile, wear away the web of the feather. But were this the

fact, it is not unreasonable to suppose that the remaining web, either in its superior or inferior part, would show some signs of wear, and at least have a rough appearance—that the shaft itself would show the same wear, or would be polished; and should none of these signs be evident, we would expect to find young birds with entire feathers. To the contrary, however, the nest is not generally so constructed as to bring the naked shaft upon the edge of the nest, but is frequently smaller, and even the shorter feathers of the tail rest as well upon its rim, and the tail is not kept in motion except when the bird is aware of some danger or the presence of man. Neither does the remaining web ever have a roughed appearance, but is invariably smooth, though often unevenly trimmed. The naked shaft, which is grooved beneath, never shows any signs of mutilation; and young birds which have never mated have the plumes more exquisitely formed, and the shafts more evenly trimmed, than the adult birds of two and three years.

Still others say that these birds formerly flew very awkwardly, turning many somersaults in the air, on account of the tail being so long and broad that it caught so much air as to overbalance the bird; that in this condition it was found by the mischievous little king-bird, which caught the tail of the motmot either to assist him or to play some prank, as boys will sometimes do with a clumsy playfellow; that in the act of so doing the web slipped off from the motmot's tail, and the latter finding himself free flew away with such ease and grace that immediately the other motmots adopted the new fashion and all trimmed their tails, and that from that day to this the motmot flies as well as other birds!

This is a peculiar combination of accident, reason and pride which it would scarcely need argument to disprove.

After over two years of careful observation, I am quite sure as to *how* this mutilation is effected. My observations I therefore give as briefly as possible.

The Momotidæ all live beneath the surface of the earth; some live in the deserted dens of the armadillo and other burrowing quadrupeds; some live in caves, some in the crevices of the rocks and cliffs, while others take up their abode nearer the homes of men, living in wells and senotes.

Their food consists of small frogs, worms, and such other things as their subterranean abodes furnish them, with a few insects which they catch while on the wing. They are seldom seen in bad weather, early in the morning, in the heat of the day, and never at night. This exclusion from light, and exposure to perpetual moisture, gives to them a loose, pale flesh, and almost colorless blood, and soft muscles, thus rendering them very lazy and stupid, though they sometimes retreat very quickly when the hunter tries to get a shot at them.

The nests are made in some secluded corner of their underground homes. They consist of sticks and mud, or grass and mud, and are seldom large enough for the bare shafts of the tail feathers to rest upon their rim. Nor

would this account for the mutilation, even were the conditions of the nest favorable; for the web of the feather is arranged laterally upon the shaft of the feather, which would require a vertical motion to wear it away, while the motion of the bird's tail is transverse to its own body, as also to the nest—a motion only calculated to wear away the shaft from beneath.

Some of the Momotidæ are very tame, and seem to have no fear of man, but rather to prefer his company, making their nests in his wells and in his cellars. Such is the *Eumomotus superciliaris*, a species whose habits I have studied more than all others.

During my residence of nearly four months in the city of Temax, near the north coast of Yucatan, about twenty of these birds lived in a well from which I used water every day. The water was drawn by means of two buckets attached each to the end of a rope, which played over an iron pulley. The well was almost forty feet deep, had been cut through a porous shell-limestone, and its walls contained many cavities into which a man could crawl many feet, but was obliged to back out. Within these cavities live the motmots, and oftentimes very venomous little reptiles, called “canchæ” by the natives. But, risking the poisonous serpents, I have frequently gone many yards into these caverns to investigate the home of the saw-bills and their work therein, and I have always come out feeling well repaid for all the danger, having invariably seen something new and interesting. At one time I have found only the nest, with four or six roundish, white eggs, with the shell so thin and transparent that the yolk was plainly visible; at another, I have found the young birds in almost every state of development—those with the tail feathers just starting being always the most interesting. The feathers all seem to grow alike to a certain point, except the middle ones, which are always a little broader towards the end; there all cease to grow except the two middle ones, which soon pass the others by about an inch and a half. Up to this point the webs of these two feathers are just the same throughout, except the subterminal portion, which is much narrower. Thus far no mutilation has taken place, but as soon as these feathers exceed the others a little more, the web begins to disappear, and the outer web of each feather is generally taken off first. This, however, is not always the case, as the inner web sometimes goes first. In very few cases have I ever seen a web trimmed farther up than just to the ends of the other tail feathers; and just as these pass the shorter ones, so are they trimmed until their growth ceases.

I have never seen the bird arrange its feathers, and especially not its tail, when above-ground, though I have seen them work for a long time with the bill, arranging the tail, while they were in the well—catching hold of it and drawing it around, first on one side, then upon the other, always using the point and not the whole of the bill.

On examining the bill, it is found to be dentated in the middle portion and smooth at the tip and base. The smooth portion of the tip of the upper

mandible fits very closely with the lower one, something after the fashion of scissors, and they are therefore well adapted to their work of feather-trimming.

On closer inspection of the shaft, we find that traces of a web still remain, showing that it did not come so by a natural growth; so that after a careful examination of the structure of the bill, and considering the unevenness of the missing webs as well as the time of its disappearance, we must conclude that what nature does not do by narrowing the feather, the bird by its natural instinct of beauty and symmetry does with its bill.

A CONTRIBUTION TO THE HISTORY OF THE FRESH-WATER COPEPODA.

BY F. W. CRAGIN, Sc. B., WASHBURN COLLEGE, TOPEKA.

The study of the fresh-water Copepods, or oar-footed *Crustacea*, of North America, has, until recently, been quite neglected. Within a few years the diligence of two or three naturalists, mainly of Professor Forbes, of the Illinois State Laboratory of Natural History, has given us substantial contributions to the knowledge of this interesting part of our fauna.

As early as 1818, Say described an American species of *Cyclops*; but his description, like those of Haldeman, Dana, and several later authors, is imperfect and not of specific value.

The free-swimming *Copepoda* known to inhabit inland waters are as follows: *Centropages*, *Osphranticum*, *Diaptomus*, *Heterocope*, *Epischura*, *Limnocalanus*, *Temora*, *Cyclops*, *Tachidius*, *Canthocamptus*, and *Attheyella*. Of these eleven genera, four—*Diaptomus*, *Limnocalanus*, *Cyclops*, and *Canthocamptus*—have been recorded as common to the fresh waters of the Old World and the New. I add *Heterocope* on the authority of my friend, Mr. William Patten, who informs me that a species is common in Watertown, Massachusetts.

Tachidius, in the Old World is known only in waters made salt or brackish by the ocean; but a species has been found by Mr. V. T. Chambers at Big Bone Springs, Kentucky, in moss wet with the mineral water.

Temora, in the Old World has been found in both salt water and fresh; but in America has not yet been discovered in fresh water.

Osphranticum and *Epischura* are known only in North America, having been described recently from Lake Michigan and Normal, Ill., by Professor Forbes.

Attheyella is as yet known only in Great Britain, one of its species living in the damp roof of a coal mine.